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ORIGINAL ARTICLE

Sexually-transmitted infections: what is the true prevalence? A cross-sectional online survey of men who have sex with men in the Veneto Region of Italy

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Keywords

MSM • STI • Prevalence

Summary

Introduction. *Rates of sexually-transmitted infections (STIs) remain high among men who have sex with men (MSM), posing serious public health concerns. The MSM population is recognized as a vulnerable, high-risk group due to barriers to preventive healthcare services and homophobic stigma.*

Methods. *A cross-sectional online survey was conducted using a questionnaire based on European Man-for-Man Internet Survey 2010 (EMIS 2010) and European Centre for Disease Prevention and Control (ECDC) core indicators specific for behavioral risks. MSM were reached between June and August 2017, using Facebook and dating apps. Descriptive statistics and multivariate logistic regression were used to analyze the data.*

Results. *A total of 324 respondents were analyzed, 88 subjects (27.2% of the sample) reported having experienced at least one STI, the most common being gonorrhea and HPV. Ten respondents reported having HIV infection, and 7 subjects (70%) of them were co-infected with other STIs. The 49.7% (161 subjects) had seen a doctor specifically for STIs. As concerns HPV vaccination, only 4.0% of the total respondents had been vaccinated. Restricting the sample to the 161 respondents who consulted an STI clinic, the 88 individuals who reported having had at least one STI amount to 54.6%. A more consistent use of condoms and larger numbers of sexual partners were significantly associated with a lower and higher risk of STI, respectively.*

Conclusions. *Comprehensive STI prevention strategies are needed to improve sexual health among MSM. Such strategies should include implementing programs to improve awareness about routine screening, and promote a consistent use of condoms by MSM.*

Introduction

Men who have sex with men (MSM) are at greater risk of multiple sexually-transmitted infections (STIs), partly due to unsafe sexual practices such as unprotected anal intercourse [1]. Although most STIs cause only mild symptoms, if any, that may not be identified as being due to a STI [2], they are a serious public health concern. They are associated with severe disease, and bacterial STIs in particular are recognized as potential drivers of HIV infection among MSM [3, 4]. To be more specific, syphilis and gonorrhea are being diagnosed considerably more frequently nowadays, almost entirely as a result of higher rates of infection among MSM. Much the same picture has been emerging in the US and Western Europe since 1998 [3, 5].

Although MSM represent a population at high risk of STIs, recent data indicate that almost one in two of all European countries have no reliable estimates of the size of their MSM population and limited data on their sexual risk-taking behavior [6, 7]. Moreover, despite the high incidence of STIs among MSM, homophobic stigma or discrimination often make them unwilling to provide information to health care personnel clinic and, even if they consult a doctor, many tend not to disclose their sexual orientation [8, 9].

With the aim of adding to the data available in the literature, the purpose of this study was to analyze the prevalence of various STIs and risk-taking sexual behavior among MSM.

Methods

Study design

Data were collected as part of a cross-sectional online survey on relationships, sex life, risks and precautions, and the use of health services, which was conducted from 4 June to 31 August 2017 on a sample of MSM, contacted through Facebook and instant messaging apps for MSM (i.e. Grindr, Hornet and PlanetRomeo).

Questionnaire

The questionnaire was based on the EMIS 2010 study [10], taking for reference the core indicators specific for MSM, as indicated by the ECDC [11]. The main indicators considered were: a diagnosis of STI in the pre-

vious 12 months; testing for HIV or other STIs; percentage of HIV-positive; number of sexual partners in the previous 12 months; habitual usage of condoms; HPV vaccination status; and awareness concerning STIs.
The questionnaire was preceded by an introduction that explained the goals of the research and how anonymity was assured, and provided instructions for its completion. Respondents could not be traced back to their profiles. Data were treated confidentially in accordance with Italian legislation, and in compliance with the Helsinki declaration.

Sample

All the MSM registered with lesbian, gay, bisexual and transgender (LGBT) associations in the Veneto Region, members of various Facebook pages with a specific LGBT theme, or simply users of apps for MSM were invited to take part in our online survey. The inclusion criteria adopted were: male sex and sexual attraction to, or sexual relations with other males; and age ≥ 18 years. There was no restriction concerning nationality as this was intended to be a wide-ranging transversal investigation. With regard to the analysis of the risk related to STI, we restricted the sample only to the subjects who visited an STI clinic because many times the STIs are asymptomatic and the self-reported cases could be an underestimation of the real frequency of these diseases.

Statistics analysis

Descriptive statistics (including means and proportions for continuous variables, and percentages and absolute frequencies for categorical variables) were used to analyze the data. The prevalence of STIs was estimated as the proportion of respondents who reported a clinically-confirmed diagnosis of STI. The $\chi 2$ test, Student's t-test, and 95% confidence intervals (95% CI) were used, as appropriate. Factors independently associated with the experience of STIs in the subjects who visited an STI clinic were examined using a multivariate logistic regression, from which adjusted ORs were estimated with corresponding 95% CIs. A p value < 0.05 was considered as the threshold for statistical significance.

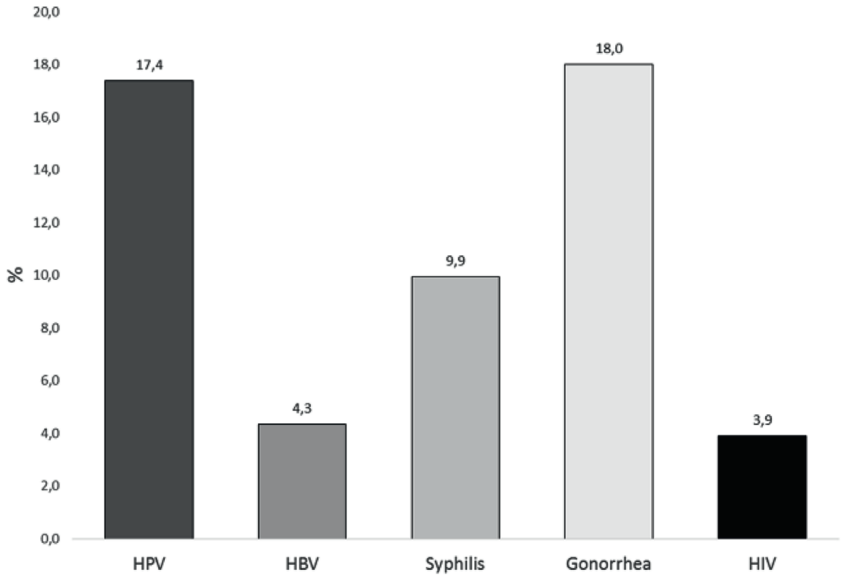
Results

Questionnaires answered by a total of 324 respondents meeting our inclusion criteria were analyzed. Respondents were a mean 28.8 years ± 8.8 years of age; and 96% (311 subjects) of them were Italian. As for their sexual orientation, 261 (80.6% of the sample) reported being homosexual, and 63 (19.4%) were bisexual. At the time of completing the questionnaire, 29.0% (94 subjects) were reportedly in an exclusive relationship, while 70.4% (228 subjects) were not. Regarding their self-disclosure, 32.7% (106 subjects) had reportedly made their sexual orientation public, 61.1% (198 subjects) had disclosed it only to some people, and 6.2% (20 subjects) had not come out. Finally, the survey established that the internet or meeting apps were the method most commonly used to meet casual male partners. Table I summarizes the respondents' demographic details.
This study included 119 cases of STI, affecting 88 subjects (27.2% of the sample). The most common STI reported was gonorrhea (18.0%; 29 subjects), followed by human papilloma virus (HPV) infection (17.4%; 28 subjects).
In the sample as a whole, 254 individuals (78.4%) were tested for HIV, 88/88 (100%) of those reported at least one other STI, and 116/166 (70.5%) of the remainder did not report another STI. Ten of these 254 subjects (3.9%) reported having HIV infection, and 7 of them were co-infected with other STIs, i.e. hepatitis B virus (HBV), syphilis, gonorrhea and HPV.
As concerns HPV vaccination, only 4.0% of the total respondents had been vaccinated (8.0% of those who had experienced STIs, and 2.5% of those who had not; p = 0.02). In the sample as a whole, 50.6% of respondents expressed interest in obtaining an HPV vaccination.
When questioned about their awareness of STIs, 13.6% of 324 respondents considered themselves very well informed about the topic. This was particularly true of the group that had experienced STIs (21.6% vs 10.6%; p = 0.01). In 72.8% of the sample as a whole (and with much the same proportions among those who had experienced STIs, and those who had not), respondents felt that public institutions should play a primary role in ensuring the dissemination of adequate information about STIs. At the same time, 77.5% of the sample judged the information currently provided by such institutions scant or inadequate (71.6% for the group that had experienced STIs, and 79.6% for the others; p = n.s.).
Restricting the sample to the 161 respondents (49.7% of sample) who consulted an STI clinic, the 88 individuals who reported having had at least one STI amount to 54.6%. Figure 1 shows the prevalence of STIs, and HIV

Tab. I. Characteristics of men who have sex with men.

	N	(%)
Age (mean ± SD)	28.8 ± 8.8	
Education status (n = 316)		
• University	117	(37.0)
• Secondary education	159	(50.3)
• Primary or lower	40	(12.7)
Employment (n = 324)		
• Student	136	(42.0)
• Employed	166	(51.2)
• Unemployed	22	(6.8)
Sexual orientation (n = 324)		
• Homosexual	261	(80.6)
• Bisexual	63	(19.4)
Relationship (n = 322)		
• Exclusive	94	(29.2)
• Not exclusive	228	(70.8)
Last met casual male partners via (n = 300)		
• Internet web pages - Meeting app	225	(75.0)
• Bar-club	18	(6.0)
• Dance club	32	(10.7)
• Other	25	(8.3)

Fig. 1. Prevalence of reported STIs and HIV infection among MSM who underwent STI-specific and HIV testing (for HIV the prevalence was calculated on 254 subjects, the other STIs on 161 subjects).



in particular, among the MSMs who underwent specific testing for STIs and HIV.

Table II summarizes the demographics and risk behavior of the 161 respondents who underwent tests, by positivity for specific STIs. Overall, the mean age of these respondents was 30.5 ± 10 years, with no difference between the group that had experienced STIs and the group that had not, and their mean age at the time of their sexual debut was 19.3 ± 5.1 years, again with no difference between the two groups.

Tab. II. Distribution of demographic characteristics and behavioral risks, by positivity for STIs.

Variable	N	STIs				OR (95% CI)	adj OR (95% CI)
		Yes		No			
		N	(%)	N	(%)		
	161	**88**	**(54.7)**	**73**	**(45.3)**		
Age (mean ± DS)	30.5 ± 10	30.4 ± 9.8		30.5 ±10.2		0.98 (0.96-1.03)	0.99 (0.95-1.03)
Age at sexual debut (mean ± DS)	19.3 ± 5.1	19.5 ± 5.5		19.2 ± 4.6		1.01 (0.95-10.7)	1.02 (0.94-1.11)
No. of sex partners in the last 24 months (mean ± DS)	12.2 ± 13	14.3 ± 14.2		9.7 ± 11.1		**1.03 (1.01-1.06)**	**1.06 (1.01-1.07)**
Sexual orientation							
• Homosexual	127	69	(54.3)	58	(45.7)	Ref	Ref
• Heterosexual	34	19	(55.9)	15	(44.1)	1.06 (0.49-2.28)	1.25 (0.55-2.84)
Sexual relationships							
• Exclusive	46	25	(54.3)	21	(45.7)	Ref	Ref
• Not exclusive	115	63	(54.8)	52	(45.2)	1.01 (0.51-2.02)	1.11 (0.53-2.35)
Condom use							
• Occasionally-never	95	59	(62.1)	36	(37.9)	Ref	Ref
• Consistent	66	29	(43.9)	37	(56.1)	**0.48 (0.25-0.90)**	**0.45 (0.22-0.87)**
Alcohol							
• Never	22	12	(54.5)	10	(45.5)	Ref	Ref
• Yes	139	76	(54.7)	63	(45.3)	1.19 (0.48-2.96)	1.24 (0.45-3.41)
Smoking							
• Never	62	34	(54.8)	28	(45.2)	Ref	Ref
• Yes	99	54	(54.5)	45	(45.5)	0.98 (0.52-1.86)	1.15 (0.53-2.49)
Illicit drug use							
• Never	119	64	(53.8)	55	(46.2)	Ref	Ref
• Yes	42	24	(57.1)	18	(42.9)	1.14 (0.56-2.32)	1.25 (0.52-2.99)
At least one behavioral risk at time of sexual intercourse*							
• Never	47	22	(46.8)	25	(53.2)	Ref	Ref
• Yes	114	66	(57.9)	48	(42.1)	1.56 (0.78-3.09)	1.63; (0.71-3.76)

*: sexual intercourse associated with alcohol or illicit drug use, or exchange of money.

In 71.4% (115 subjects) of cases, our respondents reported not being in an exclusive relationship, and 70.8% (114 subjects) said they were exposed to at least one behavioral risk (related to alcohol or illicit drug use, or the exchange of money) at the time of sexual intercourse; these proportions did not differ between the above-mentioned two groups. The reported number of sexual partners in the previous two years was significantly higher among individuals who had experienced a STI, whereas a significant protective role against STIs was associated with the consistent use of condoms (Tab. II). The multivariate analysis confirmed both these findings, with an adjusted OR of 1.06 (95% CI = 1.01-1.07) and 0.45 (95% CI = 0.22-0.87), respectively.

Discussion

The results of the present survey confirm that STIs are still common among MSM. Considering our sample as a whole, their frequency amounted to 27.2% but the prevalence of STIs rose to 54.6% of the subsample of respondents who had undergone testing for STIs. This difference reflects a weak inclination among MSM to undergo specific STI tests: less than one in two of our respondents had done so. This proportion is very low if compared with the 81.8% of a Scottish survey [12]. Many MSM experience discrimination, and this can prompt them to hide their sexual orientation. MSM are also few inclined to access HIV-related services for fear of a negative reaction from healthcare workers [8]. Because most STIs are asymptomatic, the majority of cases go undiagnosed in the absence of routine screening [2].

A different picture emerged for HIV testing. As in the report from the Centre for Disease Prevention and Control [13], and in line with other studies, 78.4% of our respondents had been tested for HIV [14]young (median age 29 [interquartile range 23-35], and the likelihood of having been tested was higher in the group that had experienced STIs. The rate of HIV infection in our sample was consistent with that of a recent study in which the prevalence of HIV among MSM was 3.9% [15].

As concerns HIV infection and syphilis, the epidemiological picture in Germany charted for the years from 2001 to 2015 pointed to a constant increase in the rates of both diseases among MSM [16]. Another study, conducted in Spain, found a rising trend in the cases of gonorrhea, which was more pronounced among MSM [17]. A recent analysis showed that being MSM represented a risk factor for both HPV and multiple infections [18] genotype distribution, intraepithelial neoplasia (AIN). Our survey confirmed that co-infection is quite common (one in three of our MSM with STIs), and found gonorrhea the most often reported infection (18%).

Multivariate analysis showed that the independent variables associated with STIs in our sample were a protective role of consistent condom use, and a higher risk related to larger numbers of sexual partners. Although it represents the cornerstone of STI prevention, condom use was still inconsistent in a large proportion of our population. This finding confirms the results of other studies, and reflects a lack of awareness of the risks associated with unprotected sex [19]. Having multiple sexual partners is common in the MSM community, and still many do not use condoms consistently. Recent data indicated that less than 60% of MSM reported using a condom [18] genotype distribution, intraepithelial neoplasia (AIN, and evidence of a limited use of condoms emerged from another study too [19]. One of the reasons for this situation lies in that "safer sex" campaigns have lost traction in this population. In the United States, for example, the percentage of men reportedly using condoms at least for anal sex dropped from 41% in 2011 to 35% in 2014 [8].

HPV is one of the most common STIs, affecting both genders and responsible for several related cancers in both men and women. The infection is highly prevalent among MSM [20] and, by comparison with the general population, MSM are more susceptible to developing HPV-related anal cancer [21]. HPV vaccination in males has proved effective in reducing HPV-associated anogenital infection and disease [22]. In the Veneto Region, free anti-HPV vaccination has been offered to males in their 12th year of life since 2015, and it remains available free of charge up until their 18th birthday, then offered in co-payment up until they are 26 years old [23]. In our survey, only 4.0% of respondents reported having been vaccinated against HPV, but about half of them (50.6%) expressed interest in obtaining HPV vaccination. MSM would benefit more from this vaccination than the general male population, and it would be well worth targeting this particular group with HPV vaccination campaigns.

Several studies have revealed an association between substance use and sexual risk-taking, especially among MSM [15]. The use of alcohol and illicit drugs is sometimes a part of this community's socializing behavior. These behavioral risks can lead to unprotected sex, and a higher number of sexual partners, raising the chances of HIV transmission [8]. In our sample too, exposure to at least one behavioral risk at the time of sexual intercourse was greater in the group reporting having experienced STIs.

Our findings should be interpreted in the light of some limitations of our study. The most important limitation lies in that we relied on self-reported information. Respondents may have under-reported any behavioral risk factors, and any hesitation to disclose such information would result in a response bias [24]. On the other hand, the anonymous nature of the questionnaire may have helped respondents to feel more free to express themselves. A second limitation lies in that, because STIs can occur without any symptoms [25], affected individuals may have a limited capacity to recognize them, and this would again result in an under-reporting of the phenomenon. A third limitation concerns the fact that this survey only recruited MSM online, so our findings may not be generalizable to the MSM population less inclined to use internet.

Despite these limitations, our analysis corroborates the known links between risk factors, STIs and MSM, highlighting the immense need to develop targeted screening

and intervention schemes to prevent risk-taking in their sexual behavior.

Conclusions

To improve the sexual health of MSM and prevent STIs, targeted interventions to reduce any risk-taking sexual behavior are warranted. Prompting change in people's behavior is always a challenge, but it would certainly be useful to involve this target population in the design, implementation and assessment of any such prevention strategies.
Finally, given the high prevalence of STIs among MSM, and their weak inclination to undergo screening, greater efforts will have to be made to improve their awareness of the importance of routine testing for sexually-active MSM.

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Conflict of interest statement

None declared.

Authors' contributions

MP: study conception, design and data collection; SC: statistical analyses, data interpretation and drafting of the manuscript; CR: study conception and design; MAB: statistical analyses and study conception; VB data interpretation, drafting of the manuscript and supervision. All authors have read and approved the final manuscript.

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